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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/611,817	06/30/2003	Jay K. Bass	10990629-3	3021

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EXAMINER	
NEGIN, RUSSELL SCOTT	
ART UNIT	**PAPER NUMBER**
1631	

DATE MAILED: 10/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/611,817	BASS, JAY K.	
	Examiner	Art Unit	
	Russell S. Negin	1631	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 July 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-18 and 35-48* is/are pending in the application.

4a) Of the above claim(s) *3-15,17,18 and 38-47* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,2,16,35-37 and 48* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *5/1/06*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Newly submitted claims 38-47 are directed to an invention that is independent or distinct from the invention originally elected for the following reasons:

The elected invention and claims 38-47 are directed to related processes. The related inventions are distinct if the (1) the inventions as claimed are either not capable of use together or can have a materially different design, mode of operation, function, or effect; (2) the inventions do not overlap in scope, i.e., are mutually exclusive; and (3) the inventions as claimed are not obvious variants. See MPEP § 806.05(j). In the instant case, the inventions as claimed serve different functions. While the elected invention is a generation of a composite image of a biopolymer array, the newly added claims are devoted to iteratively depositing reagent drops and taking images. Furthermore, the inventions as claimed do not encompass overlapping subject matter and there is nothing of record to show them to be obvious variants. There is undue search burden in examining both sets of subjects.

Because these inventions are independent or distinct for the reasons given above and there would be undue burden on the examiner if restriction were not required because the inventions have acquired a separate status in the art due to their recognized divergent subject matter, restriction for examination purposes as indicated is proper.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for

prosecution on the merits. Accordingly, claims 38-47 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Consequently, claims 1, 2, 16, 35-37 and 48 are examined in this Office action.

It is noted that applicant continues to traverse the grounds of restriction set forth in the restriction requirement of 19 October 2005 on page 6 of the "Remarks" of 28 July 2006. This traversal was considered and the restriction requirement was made FINAL in the Office action of 30 January 2006.

Information Disclosure Statement

An information disclosure statement filed on 1 May 2006 was considered. The Information Disclosure Statement filed 1 May 2006 does not contain a legible copy of each reference listed on the list of references. It is not known whether this is an error of the applicants or a scanning error by the Office. Consequently the missing references have been listed as not considered in the signed copy of the list of references attached to this Office action. If the applicants provide a legible copy of the missing references in response to this Office action, the references will be considered under 37 CFR 1.97(f), and a signed copy of the list of references indicating consideration of the missing references will be provided to the applicants without the necessity of the applicants filing a second Information Disclosure Statement.

Specifically, only the first two non-patent literature articles have been provided in the current application.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

Claims 1, 2, 16, 35-37 and 48 are rejected under 35 U.S.C. 102(a) as being anticipated by Budach et al [Analytical Chemistry, August 1999, volume 71, pages 3347-3355].

Claims 1, 2, 16, 35-37 and 48 state:

1. A method comprising:
obtaining a set of multiple images of a target feature location on a biopolymer array of multiple features, each image of the set representing the target feature location following deposition of a corresponding sub-set of multiple droplets for that feature; and
generating an overlay composite from the image set.

2. A method according to claim 1 wherein the overlay composite comprises a region of overlap of the droplet sub-sets.

16. A method according to claim 1 additionally comprising:
exposing the array to a sample;
interrogating the array following the exposure and optionally processing results of the interrogation; wherein
either the interrogation or processing is based at least in part on the overlay composite.

35. The method of claim 1, wherein each droplet is a reagent droplet deposited in a cycle of in situ synthesis of a biopolymer at the target feature location on the array.

36. The method of claim 1, wherein each droplet is ejected from a pulse-jet.

37. The method of claim 1, wherein each droplet is a phosphoramidite droplet.

48. The method of claim 16, wherein the overlay composite controls interrogation at the target feature of the array.

The article of Budach et al, entitled, "Planar waveguides as high-performance sensing platforms for fluorescence-based multiplexed oligonucleotide hybridization assays," states in the abstract, "16-Mer and 22-mer oligonucleotide capture probes with an amino function at the 5'-end were covalently immobilized on (3-glycidopropyl)trimethoxysilane (GOPTS) silanized planar waveguides in 'checkerboard'-style 2-dimensional arrays by means of ink-jet printing in order to demonstrate the potential of multiplexed planar waveguide biosensing."

In the experimental section of Budach et al, the chemicals indicated [top paragraph, column 2 of page 3348] show the use of a Cy5 fluorophor with a linker phosphoramidite on a DNA synthesizer. The last nine lines of column 1 of page 3349 of Budach et al state, "For comparison of the assay performance, three rows of oligonucleotide spots... were printed with the ink-jet, each in the upper and lower parts of the chip." Budach et al show in Figure 1 on page 3349 the apparatus for image analysis and states in the first column of page 3350, "The exposure time was 1 s per image for all measurements, and the laser beam was automatically blocked by a shutter in the dead time between the image acquisitions to reduce photobleaching." This cycling of multiple images made by multiple droplets in composite form are illustrated in Figure 2 of Budach et al on page 3351 and Figure 5 of Budach et al on page 3353 which shows overlap of droplet subsets.

The array is interrogated in Figure 3 of Budach et al on page 3352 for mean properties of intensity.

Claim Rejections - 35 USC § 103

The rejection of claims 1, 2 , and 16 under 35 U.S.C. 103(a) as being unpatentable over Svyatsky [USPAT 4,893,952] in view of Wang et al. [USPAT 4,508,463] is withdrawn due to amendments made by the applicant to the pending set of claims filed on 28 July 2006.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 16, 35-37 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al [Journal of Biomedical Optics, volume 2, 1997, pages 364-374] in view of Allio [US Patent 5,719,620] in view of Gamble et al [US Patent 5,874,554].

Claims 1, 2, 16, 35-37 and 48 state:

1. A method comprising:
obtaining a set of multiple images of a target feature location on a biopolymer array of multiple features, each image of the set representing the target feature location following deposition of a corresponding sub-set of multiple droplets for that feature; and
generating an overlay composite from the image set.

2. A method according to claim 1 wherein the overlay composite comprises a region of overlap of the droplet sub-sets.

16. A method according to claim 1 additionally comprising:
exposing the array to a sample;
interrogating the array following the exposure and optionally processing results of the interrogation; wherein
either the interrogation or processing is based at least in part on the overlay composite.

35. The method of claim 1, wherein each droplet is a reagent droplet deposited in a cycle of in situ synthesis of a biopolymer at the target feature location on the array.

36. The method of claim 1, wherein each droplet is ejected from a pulse-jet.

37. The method of claim 1, wherein each droplet is a phosphoramidite droplet.

48. The method of claim 16, wherein the overlay composite controls interrogation at the target feature of the array.

The article of Chen et al, entitled, "Ratio-based decisions and the quantitative analysis of cDNA microarray images" states in its abstract, "Gene expression can be quantitatively analyzed by hybridizing fluor-tagged mRNA to targets on a cDNA microarray." Chen continues in the fourth line of the introduction on page 364 that a function of this analysis is "to quantitatively analyze fluorescence signals that represent the relative abundance of mRNA from two distinct tissue samples. cDNA microarrays are prepared by automatically printing thousands of cDNAs in an array format on glass microscope slides, which provide gene-specific hybridization targets." Figure 1 illustrates the image acquisition apparatus while Figure 3 illustrates the image overlay. Equations 2 through 10 on pages 368-370 are utilized to analyze image properties and to interrogate the resultant image.

However, Chen et al does not teach composite imaging and use of a pulse jet for phosphoramidite droplets.

The invention of Allio, entitled, "Autostereoscopic video device" teaches composite imaging of microarrays. As is stated in column 9, line 67 to column 10 line 8, "It would also be extremely difficult to position three microarrays in the three CCD sensors while ensuring exact superposition of the three color images (red, green, blue) obtained in this way taking account simultaneously the parallelism of the microlenses and of the image planes, and of the pitch and the phase of the lenses, while nevertheless conserving the functionality and the cleanness of the sensors." Lines 64-66, column 10 of Allio state, "Electronic processing of the image becomes possible because the processing is performed on the smallest entity of the resulting composite image: the pixel,..."

However, the above sources do not teach use of a pulse jet for phosphoramidite droplets.

The invention of Gamble et al, entitles, "Methods and solvent vehicles for reagent delivery in oligonucleotide synthesis using automated pulse jetting devices," states in its abstract, "Solvent vehicles and methods of their use in the pulse jet delivery of reagents in automated oligonucleotide synthesis by the solid-phase phosphoramdite method are provided."

It would have been obvious at the time of the instant invention for someone of ordinary skill in the art to modify the image analysis method of Chen et al in view of the imaging method of Allio in view of the pulsing method of Gamble et al to result in the instant invention with a reasonable expectation of success because while all of the studies focus on imaging of microarrays, Allio et al has the advantage of using

composite images in a way to ensure exact superposition and Gamble et al has the advantage of producing an array in an automated fashion using pulse jetting devices.

Response to Arguments

Applicant's arguments with respect to claims 1, 2, and 16 on pages 7-9 of the Remarks of 28 July 2006 have been considered but are moot in view of the new ground(s) of rejection. The new grounds of rejection are necessitated by the amendments made by the applicant to the set of claims filed on 28 July 2006.

Conclusion

No claim is allowed.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Papers related to this application may be submitted to Technical Center 1600 by facsimile transmission. Papers should be faxed to Technical Center 1600 via the central PTO Fax Center. The faxing of such pages must conform with the notices published in the Official Gazette, 1096 OG 30 (November 15, 1988), 1156 OG 61 (November 16, 1993), and 1157 OG 94 (December 28, 1993)(See 37 CFR § 1.6(d)). The Central PTO Fax Center Number is (571) 273-8300.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Russell Negin, Ph.D., whose telephone number is (571) 272-1083. The examiner can normally be reached on Monday-Friday from 7am to 4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's Supervisor, Andrew Wang, Supervisory Patent Examiner, can be reached at (571) 272-0811.

Any inquiry of a general nature or relating to the status of this application should be directed to Legal Instrument Examiner, Yolanda Chadwick, whose telephone number is (571) 272-0514.

Information regarding the status of the application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information on the PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

RSN
6 October 2006

6 October 2006

10 October 2006
JOHN S. BRUSCA, PH.D
PRIMARY EXAMINER